

REMARKS/ARGUMENTS

Within the Office Action, claims 1-25, 29, and 30 were rejected. Claims 1, 6-8, 15-17, 19, 20, and 25 were rejected under 35 U.S.C. § 102. Claims 1-25, 29, and 30 were rejected under 35 U.S.C. § 103(a). By way of the above amendment, claims 1, 16, 20, 29, and 30 have been amended. Claims 31-33 have been added. Claims 26-28 were previously canceled. Accordingly, claims 1-25 and 29-33 are now pending.

Rejections under 35 U.S.C. § 102(b)

Within the Office Action, claims 1, 6-8, 15-17, 19-20, and 25 were rejected under 35 U.S.C. § 102(b) as being anticipated by Bok *et al.*, "Supercritical Fluids for Single Wafer Cleaning," Solid State Technology, June 1992, at 117-120 ("Bok"). The Applicants respectfully disagree with these rejections.

Bok teaches a system for cleaning wafers using supercritical fluids. The system comprises a chamber that cleans a wafer by pulsating a wall of the chamber, thus varying its height. As stated in Bok, at page 118:

During the cleaning cycle, the supercritical fluid is pulsated by a hydraulic mechanism. The lower chamber block is actually a thin-walled, stainless steel membrane, i.e., a diaphragm. The hydraulic fluid pressure changes the chamber height via elastic deformation of the diaphragm, i.e., the supercritical fluid pressure is varied according to the volume of the cleaning chamber.

At page 118, Bok also teaches "an expulsion cycle . . . to replenish the cleaning fluid with fresh fluid." Bok teaches cleaning a wafer by pulsating a wall of a chamber not by circulating a fluid through the cleaning chamber using a circulation line.

The independent claim 1 is directed to an apparatus for supercritical processing of a workpiece. The apparatus comprises a transfer module having an entrance, a supercritical processing module coupled to the transfer module and having a workpiece cavity for holding the workpiece during supercritical processing, a non-supercritical processing module coupled to the transfer module, a transfer mechanism coupled to the transfer module, and a circulation line coupled to the workpiece cavity and configured to circulate a supercritical fluid through the workpiece cavity. The transfer mechanism is configured to move the workpiece between the entrance, the supercritical processing module, and the non-supercritical processing module. As described above, Bok fails to teach a "a circulation line coupled to the workpiece cavity and

configured to circulate a supercritical fluid through the workpiece cavity”, as recited in claim 1. For at least this reason, the independent claim 1 is allowable over the teachings of Bok.

Claims 6-8, 15-17, 19-20, 25, and the new claims 31-33 all depend on the independent claim 1. As described above, the independent claim 1 is allowable over the teachings of Bok. Accordingly, claims 6-8, 15-17, 19-20, 25, and 31-33 are also all allowable as depending from an allowable base claim.

Rejections under 35 U.S.C. § 103(a)

Within the Office Action, claims 1-6, 8-10, 19-20, 22-25, and 29-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Number 6,110,232 to Chen (“Chen”) in view of Bok. The Applicants respectfully disagree with these rejections.

As described above, claim 1 is allowable over the teachings of Bok. Accordingly, claim 1 is allowable over the teachings of Bok, Chen, and their combination.

Claims 2-6, 8-10, 19-20, 22-25, and 31-33 all depend from claim 1. Accordingly, claims 2-6, 8-10, 19-20, 22-25, and 31-33 are also all allowable as depending on an allowable base claim.

Within the Office Action, claims 1-10, 13, 15-17, 19-20, 22-25, and 29-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen in view of U.S. Patent Number 5,979,306 to Fujikawa *et al.* (“Fujikawa”). The Applicants respectfully disagree with these rejections.

Chen is directed to a method of preventing corrosion in a load-lock chamber used in a processing system. [Chen, Abstract] Chen recognizes that a workpiece transferred from a processing chamber can carry residue that can contaminate the load-lock chamber. [*Id.*, col. 2, lines 35-45; col. 5, lines 44-50] Chen discloses a processing system that includes a degas chamber for removing etch residues from a wafer before transferring the wafer to the load-lock chamber, which could be corroded by the residues. [*Id.*, col. 3, lines 43-52] Within the Office Action it is stated that “Chen *et al.* do not disclose a supercritical processing module connected to the transfer module.” Chen discloses an apparatus that functions at or near vacuum, not at supercritical temperatures or pressures. Chen does not disclose a supercritical processing module at all, let alone one having a circulation line coupled to the supercritical processing module and configured to circulate a supercritical fluid through a workpiece cavity.

Fujikawa is directed to a stand-alone high-pressure processing chamber that reduces the chances of leakage. [Fujikawa, Abstract] In the Background of the Invention section, Fujikawa makes one passing reference to supercritical processing. [Fujikawa, col. 1, lines 9-10] Nowhere else does Fujikawa mention supercritical processing. Indeed, Fujikawa does not teach how to perform supercritical processing.

What Fujikawa does disclose is a system for reliably sealing a processing chamber. Referring to Figure 2, Fujikawa discloses shaped parts 6A and 6B, a raising and lowering actuator 11 for moving the shaped parts 6A and 6B together, and a pressure ram 18 for maintaining the shaped parts 6A and 6B together during processing. At column 4, lines 27-41, the invention in Fujikawa is described:

The above-mentioned pressing means is formed of a ram using gas pressure having a pressure medium chamber to which the pressurized gas of the gas introducing means can be introduced, and the pressure receiving area of the ram is set larger than the pressure receiving area of the processing space. By adapting such a structure, the gas of the same pressure as the gas filled in the high-pressure gas processing space is basically introduced into the gas pressure ram, so that the upper and lower vessel components are regularly kept in the mutually closely fitted state at the parting plane so long as the gas pressure is supplied, and the high-pressure gas within the high-pressure gas processing space can be prevented from being leaked through the parting plane to the outside by the synergistic effect with the sealing effect on the seal ring which is the elastic body.

Referring to Figure 5 of Fujikawa, Fujikawa discloses a system in which a processing gas is pumped by the gas compressor 26 to both the processing space 5 and the gas pressure ram 18 simultaneously. Gas is supplied to the processing space 5 to process a workpiece and gas is supplied to the gas pressure ram 18 to maintain the seal. Configured to use a single source to supply a processing gas and a sealing force, Fujikawa does not teach or suggest using a circulation line coupled to the supercritical processing module and configured to circulate a supercritical fluid the workpiece cavity. Indeed, there is no indication how Fujikawa could be adapted to accomplish this.

As described above, the independent claim 1 is directed to an apparatus for supercritical processing of a workpiece. The apparatus comprises a transfer module having an entrance, a supercritical processing module coupled to the transfer module and having a workpiece cavity for holding the workpiece during supercritical processing, a non-supercritical processing module coupled to the transfer module, a transfer mechanism coupled to the transfer module, and a circulation line coupled to the workpiece cavity and configured to circulate a supercritical fluid

through the workpiece cavity. The transfer mechanism is configured to move the workpiece between the entrance, the supercritical processing module, and the non-supercritical processing module. As described above, neither Chen nor Fujikawa teaches a “a circulation line coupled to the workpiece cavity and configured to circulate a supercritical fluid the workpiece cavity”, as recited in claim 1. For at least this reason, the independent claim 1 is allowable over the teachings of Chen, Fujikawa, and their combination.

Claims 2-10, 13, 15-17, 19-20, 22-25, and 31-33 all depend from claim 1. Accordingly, claims 2-10, 13, 15-17, 19-20, 22-25, and 31-33 are all also allowable as depending from an allowable base claim.

Within the Office Action, it is also stated, “With regard to claim 20 the limitation of using CO₂ is directed to an intended use.” Claim 20 has been amended to recite “wherein the means for pressurizing comprises a pressurizing configuration which comprises a supply vessel coupled to a pump which is coupled to the supercritical processing module.” Claim 20 does not recite intended use. In addition, the new claim 31, which depends from claim 20, recites, “wherein the supply vessel contains CO₂.” Claim 31 thus also recites allowable structure and not intended use.

Claim 29 is directed to an apparatus for supercritical processing a workpiece. The apparatus comprises means for transferring the workpiece configured to transfer the workpiece into a transfer module, means for supercritical processing having a workpiece cavity and configured such that in operation the means for transferring transfers the workpiece to the means for supercritical processing and further such that in operation the means for supercritical processing processes the workpiece within the workpiece cavity, means for non-supercritical processing configured such that in operation the means for transferring transfers the workpiece to the means for non-supercritical processing and further such that in operation the means for non-supercritical processing processes the workpiece, and means for circulating the a supercritical fluid through the workpiece cavity. As described above, neither Chen, Fujikawa, nor their combination suggests means for circulating a supercritical fluid through the workpiece cavity. For at least this reason, claim 29 is allowable over the teachings of Chen, Fujikawa, and their combination.

Claim 30 is directed to an apparatus for supercritical processing of a workpiece. The apparatus comprises a hand-off station, a supercritical processing module coupled to the hand-off station, the supercritical processing module having a workpiece cavity and configured to perform supercritical processing on the workpiece within the workpiece cavity, a non-supercritical

processing module coupled to the hand-off station, a transfer mechanism coupled to the hand-off station, the transfer mechanism configured to move the workpiece between the entrance, the supercritical processing module, and the non-supercritical processing module, and a circulation line coupled to the supercritical processing module and configured to circulate a supercritical fluid through the workpiece cavity. As described above, neither Chen, Fujikawa, nor their combination suggests a circulation line coupled to a supercritical processing module and configured to circulate a supercritical fluid a workpiece cavity. For at least this reason, claim 30 is allowable ver the teachings of Chen, Fujikawa, and their combination.

Within the Office Action, claims 11 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bok in view of U.S. Patent Number 6,235,634 to White *et al.* ("White"). Claims 11 and 12 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen in view of Fujikawa as applied to claim 8 and further in view of White. The Applicants respectfully disagree with these rejections.

As described above, the independent claim 1 is allowable. Claims 11 and 12 both depend on the independent claim 1. Accordingly, claims 11 and 12 are both allowable as depending on an allowable base claim.

Within the Office Action, claims 13, 14, 18, and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bok in view of U.S. Patent Number 6,077,321 to Adachi *et al.* ("Adachi"). The Applicants respectfully disagree with these rejections.

As described above, the independent claim 1 is allowable. Claims 13, 14, 18, and 21 all depend on the independent claim 1. Accordingly, claims 13, 14, 18, and 21 are all allowable as depending on an allowable base claim.

For the reasons given above, the Applicants respectfully submit that claims 1-25 and 29-33 are in a condition for allowance, and allowance at an early date would be appreciated. If the Examiner has any questions or comments, he is encouraged to call the undersigned at (408) 530-9700 so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,

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